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ABSTRACT

The third book in a series of natural science handbooks for Alaskan students focuses on Alaskan plantlife. The first chapter, on trees, gives general information about trees and explains how to identify and locate trees in the three main Alaskan tree families: pine, willow, and birch. The second chapter, on plants, describes 14 kinds of edible plants and 3 poisonous plants growing in Alaska. It also includes descriptions of 12 wildflowers common to the state. The final chapter details the threat to Alaska of ecological imbalances and pollution of the air, soil, water, and land. Each chapter contains a list of student exercises and activities, review questions, and teachers' notes including learning objectives. A 42-item bibliography completes the volume. (SB)

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Center for Cross-Cultural Studies

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University of Alaska

Center for Cross-Cultural Studies
University of Alaska
Fairbanks, Alaska 99701

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BOOK 3

Center for Cross-Cultural Studie

A L A S K A I S O U R H O M E

B O O K 3

A Natural Science Handbook

for Alaskan Students

John and Susan Bury
Alaska Rural School Project
College, Alaska

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Alaska Rural School Project

Center for Cross-Cultural Studies

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Book 3: Plantlife

Chapter 12

TREES

Trees are one of nature's most wonderful plants. Trees give us wood for homes, for furniture, and for burning in fireplaces. They give shade, fruit, nuts, and fun to all children who climb them. Trees are important to ecology because they provide homes and food for many animals.

A tree does not stretch its whole trunk upward while growing. Instead it grows by adding new branches to its top. These are called leaders. If you mark the position of the lower limbs of a tree, you will find that the limbs remain at the same height even though the tree grows taller. New branches on a tree grow from buds which form in the spring.

Cut a trunk or branch of a tree crosswise and the rings you see mark each year of the tree's life. These rings are made by a layer of cells called "cambium" which lies just inside the protective bark. Each year the cambium builds a layer of bark on its outer side and a layer of wood on its inner side. These layers develop during the spring and early summer, with a few produced in the fall. During winter, growth stops and a

new ring of light wood starts the following spring. By studying tree rings you can learn the story of a tree's life. Narrow rings tell of draught and poor growth while wide rings show healthy growth under good conditions.

A good way of telling a tree's age without cutting it down is to look for the little bud scars that circle a branch every few inches. Count the scars on a limb and you will know its age. Trees show their age like people do by showing their wrinkles. Young trees have smooth bark whereas older trees have split their bark by constant growth.

Why do tree leaves change color in the fall? You might say frost is responsible for this but the real reason is that the earth around the tree is becoming frozen and the tree cannot draw the water it needs. The chlorophyl that makes the leaves green fades with lack of water. It is replaced by yellow and orange pigments which are always in the leaf in small amounts and need less water. The red color in leaves is cell sap. Evergreen trees found mainly in Southeastern Alaska are green all year long because their special type of green pigment is not affected by cold weather and lack of water.

After the leaves change color a cork-like layer of cells grows between the leaf stems and the twigs to which they are attached. This cork stops the flow of life-giving

sap to the leaf causing it to die and drop off.

Trees prune themselves when the lower limbs drop off from lack of sunshine. A knot is formed by this kind of pruning when the remaining stump of the dead branch is overgrown by the trunk.

Three Areas of Vegetation

Alaska has three general areas of vegetation. The Coastal forests extend from the southeastern tip of Alaska up to Cook Inlet and Kodiak Island. Two national forests, the Tongass National Forest in southeastern, and the Chugach National Forest in the Prince William Sound area cover nearly all of the Coastal forest land.

The Interior forests are located north of the Alaska Range. Because of the long cold winters and slight rainfall during long summer days the fire hazard is high. Most of these forests have been burned over since the turn of the century and are now on their second growth.

The remainder of Alaska's land is nonforested and consists of tundra and grassland. Shrubby trees such as the willow form thickets along streams in these areas.

Alaska has only 30 kinds of trees and only half of these reach any considerable height. All the commercial timber produced in Alaska comes from just nine different kinds of trees. There are three main tree families which

will be covered here, the pine family, the willow family, and the birch family.

THE PINE FAMILY

The pine family is by far the largest and most important tree family in Alaska. This is a family of cone-bearing, narrow-leaved, resinous evergreens which includes the tamarack, pine, spruce, hemlock, fir, cedar, and juniper.

Tamarack

The tamarack is the only tree in this family which sheds its leaves (needles) in the fall. To identify it look for needles growing in a cluster of 12 to 20 on short, spur branches. The cones of the tamarack sit upright on the branches. Its bark is thin and ashy brown in color. Wood from this tree is hard, heavy, and elastic making good poles, fence posts, and railroad ties. The tamarack is found in Interior Alaska only.[1]

Lodgepole Pine

A well-known Alaska tree is the Lodgepole pine.

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[1]Raymond F. Taylor and Elbert L. Little, Jr., Pocket Guide To Alaska Trees, (Washington: United States Government Printing Office, 1950), p. 13.

To identify it look for two or three needles held in a cluster with a sheath at their base. The sheath is one to two inches long. Its prickly cones are egg-shaped and grow from one-and-a-half to two inches long. They are light yellow-brown in color. The thin bark of this tree is blue-brown and deeply furrowed. Its wood is pitchy, hard, and brittle, and is used for fuel. Its sap has a sweet orange flavor and has been used by the Indians as a delicacy. The lodgepole pine is found only in Southeastern Alaska.[2]

Spruce Trees

There are three major kinds of spruce trees found in Alaska. To identify them look for stiff, sharp-pointed needles which extend out on all sides of the branch. The cones of the spruce hang down like pendants at intervals along the branch.[3] Cut branches of spruce and of hemlock shed their needles promptly upon drying but for a display branch the freshly cut limbs can be placed in boiling water for a few minutes which will keep the needles intact.

The black spruce has short cones from five-eighths

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[2]Taylor, pp. 13-14.

[3]C. Frank Brockman, Trees of North America, (New York: Golden Press, 1968), p. 39.

to one-and-a-half inches long and full gray-brown in color. The scales of the cones are brittle and toothed. The thin bark of the black spruce has gray-brown scales. The wood is fine-grained, lightweight, and soft. The black spruce is found in Interior Alaska and in a small area around Cook Inlet.[4]

The white spruce has longer cones than the black spruce. They are slender and grow from one-and-a-half to two-and-a-half inches with thin scales. The needles and twigs of this tree have a skunklike odor when they are crushed. The bark is thin and rough but the wood is white and has a fine texture. It is used for lumber and dimension material for buildings, for flumes, sluice boxes, boats and ladders. Also, a great quantity of white spruce is cut for fuel. The white spruce is located in Interior Alaska.[5]

The Sitka spruce has the longest cones of the three main spruce found in Alaska. Its cones are light orange-brown and grow from two to three-and-a-half inches long with stiff scales. The thin bark is a dark purplish-brown but a pocket knife will reveal an inner bark with whitish color and brown dots. The Sitka spruce is the largest

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[4]Taylor, p. 15. [5]Taylor, p. 16.

spruce tree in Alaska. Its wood produces high-grade pulp considered the best on the Pacific coast. Because of its resonant qualities, large size, and uniformity the wood is valuable for piano sounding boards. It is also made into all the usual forms of lumber. Sitka spruce are found in the Coastal forests.[6]

Hemlock Trees

The hemlock trees in Alaska can be identified by their soft, blunt needles and by their cones which hang down like a pendant from the tip end of a branch only, as opposed to the spruce cones which hang along the branch.[7] Because of its dense branches and leaves the hemlock gives good shelter for birds, mice, rabbits and other small animals during the cold winter. Hemlocks require almost 300 years to mature and will live as long as 600 years. The seeds of the hemlock are known to reproduce poorly and must find shady moist areas for any success at all. Hemlock bark has been used and occasionally is still used for tanning of hides.[8]

The western hemlock has small cones, five-eighths

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[6]Taylor, pp. 17-19. [7]Brockman, p. 39.

[8]Dorothy E. Shuttlesworth, Exploring Nature With Your Child, (New York: Greystone Press, 1952), pp. 367-368.

to one inch long. Its bark is reddish brown, hard, and furrowed, becoming thick on older trees. It has a distinctively red inner bark. The wood is pale reddish brown and non-resinous. It is used for construction lumber, paper pulp, pilings, railroad ties and mine timbers. The western hemlock is found in the Coastal forests.[9]

The mountain hemlock has longer, cylindrical cones from one-and-a-half to two-and-a-half inches long. Its cones are purplish in color. Its thick blue-gray or brown bark is deeply furrowed. The reddish brown wood is not important commercially. The mountain hemlock is located in Southeastern Alaska and west to Prince William Sound and Cook Inlet.[10]

Fir Trees

The fir trees found in Alaska are easily identified by their cones which sit upright on the highest branches of the tree. The cone scales fall off individually when they reach maturity so that old intact cones cannot be found on the ground beneath these trees. The fir can also be identified by its flat needles.

The alpine fir (sometimes called balsam) has cones two-and-a-half to four inches long and purple in color.

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[9]Taylor, pp. 19-20. [10]Taylor, pp. 20-21.

The ash-gray, thin bark is smooth. The wood is fine-grained, lightweight, soft, and usually knotty. The alpine fir is found in the mountains of Southeastern Alaska and northwest to the Copper River Valley.[11]

The Pacific silver fir has longer bluish cones of four to five inches which have a distinctive barrel shape.[12] Its smooth gray bark is splotched with white. The wood is fine-grained, lightweight, soft and is sometimes used for interior finishing. The Pacific silver fir is found only in the southern part of Southeastern Alaska.[13]

Cedar Trees

An important tree in the Alaska pine family is the western redcedar. To identify it look for scale-like leaves up to one-eighth inch long which are flat and curved, and arranged on the branch in a fan-like spray. The western redcedar has small cones clustered at the ends of its branches and turning up. The branches themselves sweep downward from the trunk but turn up at the ends.[14] The bark of this tree is reddish or cinnamon brown. The wood has the distinctive odor of cedars and is of fine

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[11]Taylor, p. 22. [12]Brockman, p. 46.

[13]Taylor, p. 23. [14]Brockman, p. 54.

texture, lightweight, brittle, and very durable. It is used for shingles, lumber, boat building, poles, posts, pilings, and fishtrap floats. The Indians used this wood for their totem poles, dugout canoes and houses. The stringy bark was used to make mats, baskets and ropes. The western redcedar is found only in the southern half of Southeastern Alaska like the Pacific silver fir.[15]

Another cedar tree is the Alaska-cedar, sometimes called the yellow-cedar. Although it closely resembles the western redcedar, it can be identified by its drooping branches which give it a wilted appearance.[16] The scale-like leaves are pointed and form fan-like sprays similar to the western redcedar. The ash-gray bark of the Alaska-cedar is shreddy. The wood is a distinctive sulphur yellow, has a sweet odor and taste, a fine and even texture, and is extremely durable. It is easily worked and takes a beautiful finish. It is used for telephone poles, interior finishing, furniture, small boat hulls, cabinet work and for novelties. The Alaska-cedar is found in Southeastern Alaska and west to Prince William Sound.[17]

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[15]Taylor, p. 24. [16]Brockman, p. 56.

[17]Taylor, p. 25.

Juniper

The final member of the Alaska pine family is the juniper. Junipers are shrubby cone-bearing trees with short evergreen leaves. They are distinguished by their hard, bluish berries which contain their seed. Junipers are found throughout most of Alaska in varying heights and grow in patches up to ten feet in diameter.[18]

THE WILLOW FAMILY

The willow family of trees in Alaska includes the cottonwoods, poplars, aspens, and willows. To identify these trees look for leaves growing singly on the branches and with smooth rather than toothed edges. The male and the female flowers grow on different trees in this family. The male flower carries the pollen, while the female flower carries the seed. The flowers are found in long clusters called catkins and appear in early spring. The seeds have long white, cottony hairs and are sown by the wind. The leaves of the cottonwoods, poplars, and aspens are broad and the winter buds are large and resinous. The leaves of the willows are narrow and the winter buds are small. The catkins of the cottonwoods hang downward while those of the

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[18]Taylor, p. 26.

willow are upright.[19]

Quaking Aspen

The quaking aspen has leaves which are nearly round. They are shiny green above and pale dull green below. The thin, powdery bark is whitish or pale yellow-green and smooth on a young aspen whereas the old trees have a rough, black, almost wartlike growth. The wood is not important commercially in Alaska. The quaking aspen gets its name because its leaves tremble in even the slightest breeze.[20] This tree is one of the most beautiful trees in autumn when its leaves turn a brilliant golden yellow. In the spring it blooms with flowers.[21] The quaking aspen is found only in Interior Alaska.[22]

Balsam Poplar

The balsam poplar (also called cottonwood) has oval leaves which are larger and longer than the leaves of the quaking aspen. Its buds are pointed and sticky, covered with a pungent balsam odor which can be smelled clearly in the spring air. The bark is not smooth like the

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[19]Taylor, p. 27.

[20]Ada White Sharples, Alaska Wild Flowers, (Stanford: Stanford University Press, 1958), p. 109.

[21]Brockman, p. 88. [22]Taylor, p. 28.

quaking aspen but rather is deeply furrowed and gray-brown in color. The wood is used only slightly in Alaska. The balsam poplar is also located in Interior Alaska.[23]

Black Cottonwood

The black cottonwood is not easy to distinguish from the balsam poplar. Its resinous buds are fragrant in spring and its oval leaves are dark shiny green above and whitish underneath. The gray bark is furrowed also. The best way to identify the black cottonwood is by its seed capsules and by location. The seed capsules of the black cottonwood are hairy and split open in three parts, while the balsam poplar seed capsules are smooth and split open in two parts. The black cottonwood is found in the lowlands of the Coastal forests, while the balsam poplar is in the Interior of Alaska.[24]

Willow Trees

Willow trees can be identified by their thin delicate branches and by their winter buds. The winter buds are covered by a single scale rather than by several overlapping scales, like the winter buds of other members of this tree family. The willow can also be identified

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[23]Taylor, p. 32. [24]Taylor, p. 33.

by the bitter, quinine-like taste of its bark. The long, narrow leaves of the willow may be pointed at both ends or pointed at either the base or tip and rounded at the opposite end. Willow bark is dark or shiny, reddish brown and is divided into broad flat ridges. Alaskan willows are shrubby and are found throughout the State, extending beyond the limits of trees to the Arctic Coast, Bering Sea, and Aleutian Islands. They are important summer and winter browse of reindeer and caribou.

In many places the willow is the only wood available for fuel. It may be used for drying fish since the smoke has no bad odor. The supple twigs have been used by the Indians in basket-making and for stretching skins.[25] In early spring the new tender shoots of the willow offer an excellent source of vitamin C. The outer bark is stripped off and the inner part is eaten raw, giving seven to ten times as much vitamin C as an orange. These shoots are also a favorite food of the ptarmigan.[26]

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[25]Taylor, pp. 34-44.

[26]University of Alaska, Division of Statewide Services, Cooperative Extension Service, Wild, Edible and Poisonous Plants of Alaska, (College, Alaska: University of Alaska Extension Service, 1966), p. 30.

THE BIRCH FAMILY

The birch family of trees in Alaska includes several kinds of birch and alder trees. They can be identified by their broad leaves which are sharply toothed and grow one-and-a-half to four inches long, with alder leaves somewhat longer than birch. The leaves are pointed at the tip and rounded at the base. The male and female flowers grow on the same tree in this family. The male flowers with the pollen are found in catkins at the ends of the branches, while the female flowers are in clusters farther down the branch and develop into cones. The birch cones crumble when they mature while the alder cones remain intact and often remain attached to the branches even though they are dead.[27]

The birches have smooth, thin bark which peels off in papery strips. The bark may be creamy white, reddish, or brown, and has been used by Indians for canoes. Alder bark is smooth but not papery and is gray in color. The wood of these trees is fine textured, moderately heavy and moderately hard. It is an important source of fuel, and alder wood particularly is used in smoking meat and fish and for wood carvings.[28] The birch is especially noted for

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[27]Brockman, p. 103. [28]Taylor, pp. 44-53.

its slender, graceful, and delicate foliage which is brilliantly colored in autumn like the quaking aspen.[29]

A particular kind of birch called the ground birch is a low-growing shrub which is important as a summer food for reindeer.[30]

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[29]Sharples, p. 24.

[30]Brockman, p. 102. This book contains excellent colored pictures of trees with closeup photos of leaves, needles, buds, cones, bark, and so on.

EXERCISES

1. Gather branches from trees of various sizes and count the rings to determine the ages of the trees. Note the good and bad years in the life of the trees.
2. Grow buds indoors by collecting twigs in the fall. Cut them cleanly off with a sharp knife after their leaves have dropped off. Change their water once a week and keep in a cool place throughout the winter and when the buds are ready to burst, place by a sunny window.
3. Adopt a tree close by to study for one year. Check your tree once a week for a few minutes and note down your observations of buds growing and opening, flowers blossoming, and colors changing. Study all the life forms the tree supports such as insects, birds, and squirrels.
4. Save and exhibit evergreen sprays in a box full of cotton covered with glass.
5. Preserve leaves from different kinds of trees in your area by pressing them.
6. You might enjoy making leaf prints. The simplest way is to do ink spattering. Place a fresh leaf on a sheet of paper and hold it down with a small screen. Spatter ink over the paper with a toothbrush and when dry you will have an attractive outline of your leaf.

To make prints with printers ink which will not only show the outline but the veins of the leaf you will need a tube of printers ink, any color, window glass, rubber roller, and paper. Roll ink on the surface of the glass, place the leaf underside down on inked surface, put paper on top and roll over several times. Lift the leaf from the inked glass and place it inked side down on a piece of paper, place a clean sheet on top and roll over.

7. Set up a display of local trees, by family, showing specimens of branches with leaves, needles, cones, buds, a section of the bark, and a section of the inner wood.
8. Choose one of the soft or ornamental woods in your area and work it by carving, sanding, and polishing into a novelty item or work of art.

REVIEW QUESTIONS

Tear out this page and answer the questions as you reread the chapter.

1. Make a list of products we obtain from trees. (Use your encyclopedia for this one.)
2. Tree rings are made by layers of cells called _____.
3. New branches are called _____.
4. Why do leaves change color?
5. How do trees prune themselves, and how are knots formed?
6. List the three general areas of tree vegetation in Alaska.
7. How many kinds of trees are there in Alaska?
8. What is the most important tree family in Alaska?
9. The tamarack is the only tree in the pine family to _____.
10. The tamarack is found where in Alaska, and what is its wood good for?
11. Where is the lodgepole pine found?
12. List the three spruce trees of Alaska and tell where they are found.
13. What is Sitka spruce wood valuable for?
14. How long do hemlocks take to mature?

15. What do you look for to identify a western redcedar?
16. What is the redcedar used for?
17. For what do the Southeastern Alaska Indians use the redcedar?
18. What is the most important feature to look for in identifying the willow family?
19. How do the male and female flowers grow on willow trees?
20. The quaking aspen has leaves that are nearly _____.
21. Where is the quaking aspen found in Alaska?
22. What does willow bark taste like?
23. Where are willows found in Alaska?
24. Why are willows important to the ecology of Alaska?
25. What is alder wood used for?

NOTES FOR TEACHERS

Except for the North Slope, west coast, and Aleutian Islands many types of trees are abundant for study in Alaska. The harvesting of trees is a major industry in Southeastern Alaska and the economic importance of trees should be discussed when studying this chapter.

Some suggested objectives are as follows.

1. The student should point out the various ways a tree shows growth by buds, tree rings, position of limbs, and bark.

2. The student should be able to locate on a map the three areas of vegetation in Alaska. He should locate his own community within one of these areas.

3. The student should list the three main tree families of Alaska and be able to identify specific trees as determined by his local area and by his teacher.

4. The student should list the economic importance of the more commonly found trees.

In the history of America and of Alaska trees have often been thought of as objects in the way of progress. Trees have been cleared for farming, for cities, for suburbs, and for highways, as well as for production of wood products. It is important for the student to

understand that trees are important just standing. Trees are one of nature's major producers of the oxygen that all animals need to breathe.

Chapter 13

PLANTS

There are many similarities between plants and animals. Both move, both are made up of living cells, both breathe, feed, grow and reproduce themselves.

Plants are an important part of our ecological environment since they provide food for many animals and shelter among their leaves and roots for many small creatures. Some of our largest game animals are vegetarians and depend solely on Alaskan plants for survival. The plants also lend great beauty to the land, particularly in the vast unforested areas which would be barren without their low covering of berries, wild flowers and other plants.

The main difference between plants and animals is that plants create their food from nonliving matter through the work of chlorophyl. Chlorophyl is found mainly in the leaves. The leaves absorb sunlight which creates a chemical action changing inorganic substances into organic life-giving food.

Many of the plants growing wild in Alaska are perfectly edible for humans as well as for animals and they have been known to save the lives of isolated persons

without other available food. There are salad greens, vegetables, seasonings, starchy foods and desserts all convenient to the person familiar with Alaska's wild garden.

Celery

Wild celery, also known as cow parsnip and Indian rhubarb, may be found growing in Alaska along gravelly or sandy shores, in moist fields, and in roadside ditches. The plant grows up to ten feet tall and displays white flowers in umbrella-like clusters at its top. In early summer the tender stalks and leaves are gathered before the plant flowers. The leaves are a good source of vitamins A and C, and may be cooked as a green vegetable. The stems and leaf stalks can be peeled and eaten raw or cooked as a vegetable, or used in soups.[1] The dried stalks and skeleton flower clusters are beautiful in winter when a heavy snow fall makes the plant appear to bloom again.[2]

Marshmarigold

The cowslip, or marshmarigold, is a succulent,

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[1]University of Alaska, Division of Statewide Services, Cooperative Extension Service, Wild, Edible and Poisonous Plants of Alaska, (College, Alaska: University of Alaska Extension Service, 1966), pp. 67 and 18.

[2]Ada White Sharples, Alaska Wild Flowers, (Stanford: Stanford University Press, 1958), p. 68.

rapidly spreading plant found in marshy wet places along streams and ditches, and in swamps and wet meadows. Its flowers are a deep yellow but the leaves and stems are best for eating before the flower appears. The raw leaves of this plant contain a poison which is destroyed when they are cooked. The roots of the marshmarigold are long and white and when boiled look like sauerkraut.[3]

Fern

The spreading wood fern has a fat underground stem covered with what looks like a bunch of tiny bananas. These "bananas" can be roasted, the outer brown covering removed, and the inner part eaten. They are a good source of energy. The young fern fronds are gathered while still curled and are boiled or steamed and served like asparagus with butter or cream sauce. The fern grows in moist woodlands.[4]

Labrador Tea

Labrador tea is a dwarf, evergreen shrub growing one to two feet tall. Its leaves are dark green and shiny on top and fuzzy gray underneath. It grows in the muskegs of Southeastern Alaska and in the Interior.[5] The leaves

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[3]University of Alaska, p. 9.

[4]University of Alaska, p. 14. [5]Sharples, p. 76.

are strongly aromatic and make a very palatable tea, although oldtimers in Alaska advise that it not be used in too large quantities as it can cause intestinal disturbances.[6]

Plantain

Seashore plantain is probably familiar to any student living along the coast from Ketchikan north to the Gulf of Alaska and westward to the Aleutians and Commander Islands. It grows up to ten inches high with many long narrow leaves rising from one point on the root. Its flowers are very small and crowded into a spike at the end of a leafless stalk. In May and early June the young leaves can be used raw in salads or can be cooked like spinach.[7]

Rhubarb

Wild rhubarb growing from two-and-a-half to six feet tall may be found in most parts of Alaska except southeastern. It grows along highways and river banks, and is scattered across the tundra. The young stems are gathered in early summer and used just as domestic rhubarb

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[6]University of Alaska, p. 17.

[7]University of Alaska, p. 21.

after the outer skin has been stripped off.[8]

Cucumber

The wild cucumber is recognized by its bellshaped flowers and berries which hang individually from a slender stalk in the base of the leaf. The broad leaves grow two to five inches long and are arranged alternately up the stem. The edible berries are yellowish white, orange, or light red when mature. This plant is common along the coast and in the Interior. Its young tender shoots have a fresh cucumber-like flavor for mixed salads.[9]

Rose

The fragrant flowers of the wild rose are familiar to many Alaskans. This plant with its bright pink flowers with yellow centers likes sunshine and the warmer parts of Alaska. Its seeds are carried in pods called rose hips which look like little orange apples and which are one of the richest known food sources of vitamin C. Both birds and people find rose hips to their liking.[10] The hips are gathered in the autumn and boiled gently to extract the

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[8]University of Alaska, p. 23.

[9]University of Alaska, p. 34.

[10]Sharples, p. 125.

juice which is mixed with other fruit juices or used for jellies and syrups. The pulp is sieved and used for jams and marmalades. The flavor of the hips needs to be enhanced by combining it with a tart fruit such as the lowbush cranberry. These hips often remain on the rose bush all winter and, although they may be soft, they continue to be edible. The leaves of the wild rose have been used to make tea.[11]

Chives

Wild chives are found abundantly around Nome and in the Interior of Alaska. The wild chive is a form of the common garden chive with small bright lavender-pink flowers massed in a ball-shaped head just above the tall slender leaves.[12] The wild form is very strong and should be used sparingly but makes a nice addition to salad, or may be used to flavor meat and fish dishes.[13]

Seaweed

In Southeastern Alaska, along the Gulf of Alaska, and westward to Unalaska seaweed is collected in May and

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[11]University of Alaska, pp. 44-45.

[12]Sharples, p. 5

[13]University of Alaska, p. 57.

early June at low tide. The plants collected are about one foot long and two inches wide with very wavy edges. It is green when fresh but soon turns black as it drys. It is prepared by drying, grinding, and further drying, then is stored in a cool dry place to be eaten raw or to be used in fish stews. It has a nice salty taste and is very rich in iodine.[14]

Lichens

Many kinds of lichens are found throughout Alaska but some caution must be used before eating them. Some are poisonous, and most contain acids strong enough to cause severe intestinal irritation in man. They must be soaked in several waters then drained, dryed and pounded to a powder which may be added to soups.

One of the more common lichens is Iceland moss which grows in tangled masses up to two inches high and is brown to olive-gray in color. It is found in open places.

Reindeer moss grows in carpetlike masses two to four inches high and is grayish-white or silvery in color. It is found in greatest abundance in the foothills of the Brooks Range and is an important food of the reindeer and caribou.

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[14]University of Alaska, p. 71.

Rock tripe grows in circular disks about three inches in diameter and is black in color. It grows on exposed cliffs and rocks in the foothills of the Seward Peninsula and in the Alaska Range.[15]

Lilies

The Alaskan water lily, or yellow pond lily, grows from large roots submerged in water. The huge floating leaves can be a foot across and the cup-like flowers are a deep yellow.[16] This lily is found in ponds and along the shallow edges of lakes throughout Alaska north to the Brooks Range. It is a favorite food of moose, and muskrats and beavers cache the root for winter food. The roots can be boiled or roasted and eaten as a vegetable.[17]

The black lily (also called squaw lily, rice root, and Indian rice) is found all along the coast of Alaska and in Central Alaska. The bulb of this plant grows underground and is covered with numerous bulblets which look like a cluster of boiled rice. The plant itself grows one to two feet tall and has a bell-shaped flower of deep reddish-brown color. The bulbs are boiled and added to

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[15]University of Alaska, p. 73.

[16]Sharples, p. 92.

[17]University of Alaska, pp. 74-75.

fish and meat stews or are pounded to make a kind of flour which can be used for bread. There are many instances of people having lived on these bulbs for a long time when other food was scarce.[18]

Fireweed

The fireweed plant of Alaska can be thought of as having double beauty. Not only is it a beautiful wild flower but also it is the first plant to reappear after a destructive forest fire has left its ugly mark on the landscape. The fireweed with its bright pink flower adds beauty to what would otherwise be a blackened scar on the land. Its bright flowers are followed by soft white seeds that float far in a light breeze reseeding the plant over a wide area. Fireweed grows well in soft soil along roads and reaches heights of eight feet. The young shoots are tender in the spring and make a good addition to salads. The young stems may be peeled and eaten raw.[19]

Poisonous Plants

There are poisonous plants in Alaska so one must be

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[18]Sharples, p. 57.

[19]Robert S. Lemmon and Charles C. Johnson, Wildflowers of North America, (New York: Nelson Doubleday, Inc., 1961), p. 190.

careful not to eat unfamiliar plants. If a positive identification cannot be made, the plant should not be experimented with as a food source. The baneberry with its grapelike bunches of red or white berries is one of the poisonous plants of Alaska. It is found in Southeastern Alaska, on the Kenai Peninsula, around Kodiak, Bristol Bay, and the Yukon River district as far south as Anvik. As few as six of these berries can cause poisoning.[20]

The poison water hemlock, or poison parsnip as it is sometimes called, inhabits wet meadows, ditches, stream banks and the edges of tundra lakes. It is found in Southeastern Alaska and throughout the Interior north to the Brooks Range. It has small, white flowers growing in an umbrella-like cluster. Its foliage is coarse and much divided. This plant produces a yellow fragrant oil which may be used to identify it. A very small quantity of the water hemlock root can cause fatal poisoning.[21]

There are several kinds of lupines growing in Alaska and all of them should be considered poisonous. The lupine grows one-and-a-half to four feet high and has blue to purple flowers in spike-like clusters. It is found in Southeastern Alaska north to Yakutat, west to

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[20]University of Alaska, p. 77.

[21]Sharples, p. 68.

Valdez and the Alaska Peninsula, and in the Aleutian and Pribilof Islands, as well as in the Interior.[22] The plant causes fatal inflammation of the stomach and intestines.[23]

Berries

A multitude of berry bushes provide food for Alaska's birds, animals, and people. At one time they were the only source of fresh fruit available to the people. Berries are eaten raw or are made into pies, jams, jellies, and sauces. Some are canned, dried, or frozen for use during the winter.

A large family of berries includes the salmonberry with its yellowish-orange fruit found in abundance in Southeastern Alaska. The cloudberry which inhabits moist boggy tundra all along the Coast and in the Interior bears fruit which resembles baked apples in color and flavor and provides a rich source of vitamin C.[24] The red raspberry is found in Southeastern Alaska and in the open woods and brushlands of the Interior. It has a splendid flavor. The nagoon or lagoon berry produces a fragrant red berry of

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[22]Christine Heller, Wild Flowers of Alaska, (Portland: Graphic Arts Center, 1966), p. 79.

[23]University of Alaska, p. 81.

[24]University of Alaska, p. 50.

excellent flavor which is much prized for jelly. It is found in swamps and tundra areas.[25]

Another family of berries includes the lowbush blueberry with its excellent-flavored fruit. On this low-growing plant the flowers appear before the leaves. It is located along the coast. The tall blueberry which is found in Southeastern Alaska on bushes up to eight feet tall is also excellent in flavor. The red huckleberry of Southeastern Alaska bears transparent red fruit. Its white bell-shaped flowers which appear after the leaves are also considered a delicacy by some people. The lowbush cranberry or lingenberry with its dark red fruit has a matted growth in boggy areas. It has thick oval evergreen leaves and pink flowers in clusters at the tops of its stalks. It is found along the coast and in parts of the Interior.[26]

The highbush cranberry, sometimes called mooseberry, is a shrub of straggling growth which likes shade and moist, porous soils. Its reddish-orange or scarlet fruit is pleasingly edible.[27]

The currant, or gooseberry as it is known along the coast, bears red or shiny black fruit. The currant is

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[25]Sharples, p. 125. [26]Sharples, p. 148.

[27]Sharples, p. 151.

often dried and used in place of raisins.

Wild strawberries are found only along beaches just above the highwater mark in Interior and Western Alaska. Although smaller in size than the domestic berry, their excellent flavor justifies the work of gathering them.[28]

The bearberry is not usually found in large quantities but may be found in locations where other berries are absent. It lives in Arctic regions on bare rock, gravel and dry tundra where it produces black fruit, and it is found in the woods of lower altitudes where it bears red fruit. The berries remain on the plant throughout the winter making it available over a longer period.[29]

An interesting Alaskan berry is the soapberry. When its red berries are beaten in water they give rise to a froth like soapsuds. Although the raw berry is bitter, it becomes quite edible if mixed with sugar and water and beaten to form the foam which can be used like whipped cream.[30]

No doubt you are familiar with many other kinds of berries in your own vicinity. There are bright red

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[28]Sharples, p. 57.

[29]University of Alaska, p. 37.

[30]Sharples, p. 76.

wineberries, purplish black crowberries or mossberries, and bright orange timberberries to name a few more Alaskan berries. Add to these the berries you know of and enjoy them all.

Wild Flowers

Not to be excluded from this unit on plants of Alaska are the many and beautiful wild flowers found all across the State. The wild flowers are of unequaled beauty when in bloom across miles of Alaskan countryside. They furnish food and homes for untold numbers of insects, birds, and small animals. It is impossible to list all of the Alaskan wild flowers here but some of the more common or widespread ones shall be mentioned.

The first flower of Alaska is the forget-me-not which has been designated as the official State flower and grows profusely all over northern Alaska and as far south as Haines. This light blue flower with its yellow center varies in height from being nearly stemless on mountain tops to eighteen inches high in lower altitudes.[31]

The shooting star favors wet meadows and blooms in late May or early June in Southeastern and Central Alaska. Its inch long flowers look like feathered darts the points

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[31]Sharples, p. 89.

of which are black and the rest being purplish-pink. These flowers are also called bird bills.[32]

The bog-loving Alaska cotton appears in various disguises in different locations in Alaska. In alpine zones it bears one small white head on each stem. In Southeastern and Southwestern Alaska it bears several silky white heads on one stalk, while near Juneau its single head is beige in color. Over swamplands in the Interior it forms the infamous large humps with its silky heads growing close together that make it nearly impossible to walk across the meadows it inhabits. Alaska cotton actually blooms in early spring but later in the summer it has a head that looks like a flower made of white cotton. At the end of the blooming season the white tufts of fiber operate as parachutes to distribute the seeds of the plant.[33]

The pretty bluebell, whose name is description enough, is found as a tall flower along the southern coast of Alaska and as a little flower in all other parts of Alaska, except for the far north. It can grow in the most meager gravelly soil and lends its beauty to places that

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[32]Leah J. Peterson, This Is Alaska, (Seattle: Cascade Pacific Books, 1958), p. 67.

[33]Sharples, p. 56.

are otherwise barren.[34]

Throughout the coastal region from Nome to Ketchikan the wild iris may be found blooming in June. Its flowers are purple and bloom above the tops of long sword-shaped green leaves. It favors damp, cool spots.[35]

The blue gentian is familiar to many Alaskans and is considered among the most desirable of alpine plants. It is found throughout Alaska and is believed to have been used by the natives as a plant with medicinal qualities.[36]

Johnny-jump-up is a little yellow violet and one of the first flowers to appear in the spring. It is a welcome sight after the long Alaskan winter.

The dark blue monkshood is distinguished by its one enlarged leaf which forms a hood over the flower. Long tongues are necessary to reach the honey in this plant and it is largely dependent upon bumblebees and hummingbirds for pollinization.[37]

Very early in the spring, before its leaves appear, the large deep-yellow spikelike flower of the skunk cabbage appears. The leaves which follow, before the flower fades, attain up to five feet in height. The name is hardly

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[34]Peterson, p. 70. [35]Sharples, p. 69.

[36]Sharples, p. 66. [37]Sharples, p. 4.

deserved and has created considerable unjust prejudice against this impressive plant. Its perfume may not be particularly agreeable, but it is not at all insistent.[38]

Another early spring beauty is the crocus with its lavender blossom and gold center which follows the disappearance of snow up the mountain slopes, blooming in clumps among the rocks.[39]

A tall infamous shrub in Southeastern Alaska is the devil's club whose parts are all densely prickly. It is a menace to anyone traveling through unbroken country. However, the large leaves and clusters of red berries actually make it a handsome plant.[40]

Another familiar flower around forested parts of Alaska is the dogwood with its green flower enclosed in a large collar of four white petals. The flower is followed by a cluster of red berries which, although inedible, are pleasant to behold.[41]

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[38]Sharples, p. 84. [39]Sharples, p. 112.

[40]Sharples, p. 49. [41]Sharples, p. 41.

EXERCISES

1. You can get lasting pleasure out of wild flowers by pressing them. After you have picked your flowers be sure to keep them damp before you press them by placing them between damp newspapers. To press the plants lay them on top of a piece of newspaper and arrange them to look as natural as possible. Cover them with a layer of newspaper as thick as the thickest part of the plant and continue to do this layer upon layer. Place a board and weights on top of this and keep in a warm, dry location for at least ten days.
2. Prepare a fresh spring salad using edible plants available in your area.
3. Do some field research to find the wild flowers or berries growing in your area. Keep a record or make a chart showing color, height of plant, size of flowers and leaves, location, type of soil and the date in bloom for flowers or the date ripe for berries.
4. Study the development of plants in the spring. What comes first in each plant's new growth? Do plants all bloom at the same time?
5. Plant seeds of the same type of flower in the same soil and in similar containers. Place them in different conditions of light, moisture, and temperature, and

study the differences.

6. Study an area recently burned or logged. Note the plants that are starting to grow in this area. Which start to grow first and which follow later?

REVIEW QUESTIONS

Tear out this page and answer the questions as you reread the chapter.

1. List the similarities between plants and animals.
2. Why are plants important to the Alaskan ecological environment?
3. What is the main difference between plants and animals?
4. Where would you find wild celery?
5. The leaves of wild celery are a good source of _____.
6. How can the spreading wood fern be eaten?
7. Where can the fern be found?
8. What can you make out of labrador tea?
9. Where would you look for seashore plantain and how would you eat it?
10. How tall does Alaskan wild rhubarb grow and where can you find it?
11. How is the wild cucumber recognized?
12. The wild rose is one of the richest known food sources of _____.
13. How are rose hips fixed for eating?
14. Where is the wild chive found?
15. Seaweed is rich in _____.

16. Why should lichens be carefully prepared before being eaten by man?
17. What plant found in ponds and lakes is a favorite of the moose?
18. What is the "food" part of the black lily?
19. Why does the fireweed have "double beauty"?
20. In what way is the fireweed shoot good to eat?
21. List the three poisonous plants of Alaska along with their location and tell how to identify them.
22. Why are berries so important in Alaska?
23. Give the geographical location of the following berries: Salmonberry; Cloudberry; Red Raspberry; Lowbush Blueberry; Tall Blueberry; Currant; Wild Strawberry; Bearberry.
24. Why are wild flowers important to insects, birds, and small animals?
25. What wild flower is the Alaska State flower? Where can it be found?
26. What are bird bills?
27. Does Alaska cotton look the same everywhere in Alaska? Explain.
28. Wild iris favors what type of environment?
29. What wild flower do the natives use for medicine?
30. Why is johnny-jump-up a welcome sight?
31. What shrub is a menace in Southeastern Alaska?

NOTES FOR TEACHERS

Food and oxygen-producing plantlife make up an integral and necessary part of our ecosystem. In studying this chapter the teacher should direct the student to relate specific Alaskan plants to the chain of life. Lichen is the main food of caribou and caribou is a major food item for the wolf and for some humans. The bear family feeds on berry bushes and when there is a bad berry season, hungry bears can become a danger to the human population. Many people in Alaska, particularly the native people, use the various forms of berries as a major part of their diet.

Suggested objectives for the student are as follows:

He should be able to list in the classroom or illustrate in the field each of the following:

(a) Why plants are a necessary part of the ecosystem and how they fit into the chain of life as discussed in the Introduction.

(b) The basic similarities and differences between plants and animals.

(c) The edible plants of Alaska's wild garden found in his locale.

(d) The poisonous plants, berry bushes, and more

common wild flowers found in his area.

Chapter 14

CONCLUSION

The great crisis of our ecosystem is the loss of equilibrium, a loss of balance that could eventually place all life in danger. This imbalance of nature is caused by man and his pollution which is destroying the "ekois", or house, of all living things.

An example of this destruction is found wherever man empties his raw untreated sewage directly into the ocean, which is common to almost all coastal cities and villages in Alaska. Sea urchins feed on the organic materials that make up sewage and their population multiplies faster than normal. They also eat the valuable kelp which feeds many animals including man. Because the sea urchin population has grown faster than the ecological balance would normally allow, they are consuming nearly all available kelp and preventing the growth of new crops.

Man has violated the laws of nature's balance and in doing so has endangered the biosphere of the entire earth. Today in his modern city man destroys his own land and imports food from other areas which are also being destroyed. Nature's delicate balance is becoming unbalanced both from pollution of the water, land, and air, and from the actual destroying of water, land, and air.

The modern child that lives in Anchorage uses more than fifty times the resources of his environment than did an Alaskan native child before the coming of the white man.[1] The modern child in his lifetime will use twenty-six million gallons of water, 21,000 gallons of gasoline, 10,000 pounds of meat, and 98,000 pounds of milk and cream.[2]

Today in Alaska many ecologists are worried over the possibility of oil spills on or near the North Slope oil field similar to those off the coasts of Southern California and Florida. The Arctic ecosystem is so vulnerable to pollution that the North Slope threatens to become a classic example of man's mindless destruction. The intense cold impedes nature's ability to heal itself; tire marks made in the tundra 25 years ago are still plainly visible.

Since the polar ice cap and North Slope tundra are always frozen, spilled oil would run off and be trapped in the narrow seasonally unfrozen coastal area. This oil would kill the plankton which in turn would kill the fish and mollusks that feed on it. Lack of sea life would result in death for the polar bears, seals, walrus, and

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[1]"Environment". Time. February 2, 1970, p. 59.

[2]"Environment", p. 59.

whales that feed on it. Eventually the Eskimo would be endangered since he feeds on the Arctic mammals.

Water and soil pollution is only a small part of the unbalancing of the ecosystem. In the United States, Alaska included, 200 million tons of solid waste is thrown into the air each year and is in turn breathed by all living things. Not only are we slowly polluting the air, water, and land, we are also rapidly eliminating valuable land as part of the ecosystem. As man builds roads, houses, and factories, he is destroying the land cover of plant life that gives all animals, including man, the oxygen that they breathe. Each year the United States alone paves in concrete over one million acres of oxygen-producing trees.

The scars of unplanned and uncontrolled development are many. Enter any major city in Alaska and you will find along the highways on which you enter slum areas as bad as any in the lower "48", except not as large. The beautiful countryside surrounding the cities is being destroyed by unplanned housing developments, commercial building, garbage dumps, junk yards, and gravel pits. On the highways between the cities you find abandoned shacks of homesteaders who didn't make it. North of Fairbanks the land is scarred by gold dredges as bad as the strip mining of Appalachia.

The Federal Government is responsible for many of the ecological scars found in Alaska. Land for a government installation is cleared without regard for the ecology of the area by pushing trees and underbrush into great piles to rot. Every year thousands of empty oil drums are left lying around. Some government posts have been simply abandoned to deteriorate with time.

Hunters who crisscross the tundra in machines leave trails that will remain as scars for over one hundred years before the delicate and fragile ecological balance is restored.

If you live near the ocean, take a walk along your beaches. Watch the sea birds feed on the ocean life, or are they feeding on our poisonous garbage and sewage that will disrupt their egg-laying and perhaps kill the birds themselves?

Take home a bucketful of lifeless-looking sea mud and sift it through a screen. Do you find worms, snails, fiddler crabs, mussels, and other miniature organic life, or do you find bottle lids, flip top openers, and cigarette butts?

Walk along a stream in the fall. Do you see salmon moving upstream or are they dying trapped before they reach their spawning ground because of snags and downfallen timber left by slipshod logging? Drive the

Richardson or Glenn Highway during the caribou crossing. Do you see dedicated sportsmen selectively and responsibly hunting these animals, or do you see mass destruction with hundreds of hunters shooting from the road or running down herds with snow machines? How many moose carcasses have you seen with only the head or horns missing?

Man is an animal and is part of, and not above or separate from, his ecological environment. Like the moose or bear or otter or porcupine or hemlock or wildflower he takes from his element and gives to it. He is supported by it and it supports him. By destroying or unbalancing his environment he is in effect destroying himself.

> Something will have gone out of us as a people if we ever let the remaining wilderness be destroyed; if we permit the last virgin forests to be turned into comic books and plastic cigarette cases; if we drive the few remaining members of the wild species into zoos or to extinction; if we pollute the last clean air and dirty the last clean streams and push our paved roads through the last of the silence, so that never again will Americans be free in their own country from the noise, the exhausts, the stinks of human and automotive waste. And so that never again can we have the chance to see ourselves single, separate, vertical and individual in the world, part of the environment of trees and rocks and soil, brother to the other animals, part of the natural world and competent to belong in it.[3]

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[3]Wallace Stegner, How To Teach Wilderness Conservation, ed. Thelma Garder (San Francisco: Sierra Club, 1965), p. Inside front cover.

In nature all life, animal and plant, is dependent on each other to maintain a proper ecological environment so that all may fulfill their life functions. Man is a part of this nature. He is neither separate nor superior in the fact that he partakes and is supported by his environment as much as any animal. We should not deny man's superior intelligence or creativity but we should at the same time place him correctly in this study as an integral part of the Alaskan ecology.

The Alaskan native before 1741 was a definite and functional part of the Alaskan ecology. He was a predator who depended on other animals for food and, because his means of obtaining these were limited by weaponry, he did not over-kill a species and at times was actually preyed upon himself. His life, like his fellow animals, was survival of the fittest with elderly, sick, or weak humans giving in to the harsh environment. In so doing these humans actually helped their people by not being a burden when the burden of unproductive mouths was too costly. This is no different than the sick or eak caribou becoming victim of the wolf.

The native had one most basic belief, that the earth was life-giving and he was its son. We can still see this today in his rites and dances for rain, or good crops, or to bring the white whale or seal. Before the

coming of white men the wilderness remained pure with the native treading the land with reverence. The land and the native were one and the same, related together without concept of property, and ownership.

Each native shared land that was held in common by his community. It is not difficult to understand why the Indian and Englishman from the 1600's onward fought each other. The Englishman with his charters, property deeds, and bills of sale thirsted for land and this was the land of the Indian who believed it sacred. The white man had little appreciation for the great warrior Chief Tecumseh who said, "sell the country?...Why not sell the air, the clouds, the great sea?"[4]

The American citizens of 1970 find more and more a need to return to the wisdom of Tecumseh and his fellow redmen. We are not outside of nature but a part of it and the right to the land of all future generations is as strong as our own. We are beginning to realize as the Indian has, that we must learn from nature, we must listen to the earth, and refill our spirits through contact with animals and the untamed land.

If we are to preserve our own ecological

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[4]Stewart L. Udall, The Quiet Crisis, (New York: Holt, Rinehart, and Winston, Inc., 1963), p. 20.

environment, we must give the land the reverence that the native always has. We must remember that while man determines the character and future of the land, that same land determines the future and character of man. If we destroy our land, we destroy ourselves.

> Wilderness is an anchor to windward. Knowing it is there, we can also know that we are still a rich nation, tending to our resources as we should--not a people in despair searching every last nook and cranny of our land for a board of lumber, a barrel of oil, a blade of grass, or a tank of water.[5]

There is still room for man to grow in Alaska but for how long? Will we reach a point of no return before we realize that we have used up our growing room through waste and exploitation? In Alaska we have a magnificent opportunity to show respect for wilderness and wildlife values. The wonders of the wilderness still abound here; if we spoil them, we cannot excuse their defilement with pleas of ignorance.[6]

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[5]Senator Clinton P. Anderson of New Mexico, cited by Stewart L. Udall, The Quiet Crisis, (New York: Holt, Rinehart, and Winston, Inc., 1963), p. 193.

[6]Udall, p. 194.

EXERCISES

1. Make a list of the proper ways the wilderness should be treated when you are in it--fire, safety, trail usage, litter disposal, and so on.
2. Make a list of the things you would need if you were to pack into the Alaskan wilderness for two weeks and you had to carry everything.
3. Tell what you would do if lost in the wilderness. How would you get food and water? How would you signal searchers? Should you stay in one place or move?
4. Learn to read a topographic map. A set of 100 study maps illustrating various topographic features is available from the United States Geological Survey Office in Washington, D.C., or Denver, Colorado.
5. Bring in a gallon of water from a nearby river, stream, lake, or ocean. Study with your own eye and with a microscope the life forms found. If possible compare salt water to fresh water.
6. Ask an officer of the State Fish and Game Department or Federal Forestry Department to visit your class and speak about his wildlife specialty, i.e., biology, law enforcement, timber management, and so on.
7. Place a board on the ground in a damp area for several days and study the animals underneath it. Which are

the herbivores? Which are the carnivores? Which are scavengers?

8. Discuss or list the effects caused by man disturbing the ecological balance of nature such as the extinction of the passenger pigeon, or the effect when man kills off predators. When man kills too many wolves and coyotes causing the deer, or caribou or moose to become too populous for an area to sustain them, what happens to grasses, twigs, branches and leaves? How does over-crowding affect these animals?
9. Bring a cubic foot of soil into the classroom. Study and list the number and kinds of insects found.
10. Keep a notebook of newspaper articles and magazine articles on current conservation issues.
11. Make a chart of life zones from sea level in southern Alaska to the top of Mt. McKinley. Show the major plants and animals in each zone. Show the annual rainfall of the area where the plants are found.
12. After studying this unit on Alaskan wildlife and after you have made mammal and bird charts for your area, make a list for each animal of the main characteristic that enables it to survive in its environment.
13. Make an animal map showing where in Alaska animals can be found or where in your geographical area of Alaska you have observed animals.

REVIEW QUESTIONS

Tear out this page and answer the questions as you reread the chapter.

1. What is the great crisis of our ecosystem?
2. What happens when man empties his raw sewage into the ocean?
3. The modern child uses _____ times more resources than did the native child before the white man's arrival.
4. Why is the Arctic ecosystem so vulnerable to pollution?
5. What are the scars of pollution found in Alaska?
6. Why was the Alaskan native before 1741 a definite and functional part of the Alaskan ecology?
7. What was the native's most basic belief?

NOTES FOR TEACHERS

Having finished the material let us return to the generality that was stated as the basic behavioral objective of this thesis--Can the student understand and appreciate the uniqueness and diversity of his Alaskan "ekois", or house? Does he realize that this house is in danger of unbalance caused by man's pollution? Can the student explain how and why everything in nature is tied together and dependent on all other living things, whether it be the plankton in the ocean, the lemming, or man, and if one of these life forms is adversely affected by pollution, all life forms in turn are affected?

Can the student understand why a proposed pipeline or a new highway could be a threat to the ecology of an area and why such an installation must be studied carefully and weighed against the danger it might pose to the ecosystem?

Have the students clean up their school grounds and suggest they might do the same near their homes.

One objective would be for the students to go out into their Alaskan community and make a list of all the forms of pollution they see. The class could compile this information and send it to the local governing agency.

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